GRM-120

Coding Neurodivergent

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Abstract

This work-in-process innovative practice paper in nontraditional students provides a look at neurodivergent individuals learning coding, specifically Python, and the struggles and benefits that come from the way their brains are wired. This literature review was conducted to look at the benefits and struggles of learning to code as a neurodivergent individual. One area that has not been studied extensively is the learning of Python, or coding in general, by neurodivergent populations. This includes the benefits a neurodivergent learner may glean from learning Python as well as the challenges they may encounter - anything *which* makes their experience different from that of a neurotypical Python beginner. Outcomes for which data was sought included cognitive challenges neurodivergent individuals may face (such as difficulty understanding abstract concepts or issues with motivation), ways in which the neurodivergent brain may be well-suited to learning Python, and ways in which neurodivergent populations may benefit from learning Python.

The TIOBE Programming Community index (April 2025 below) is an indicator of the popularity of programming languages. The index is updated once a month. The ratings are based on the number of skilled engineers world-wide, courses and third party vendors.

Apr 2025	Apr 2024	Change	Programming Language	Ratings	Change
1	1		Python	23.08%	+6.67%
2	3	↑	C++	10.33%	+0.56%
3	2	↓	C	9.94%	-0.27%
4	4		Java	9.63%	+0.69%
5	5		C#	4.39%	-2.37%

Introduction

There has been little research done regarding learning Python, or coding in general, as a neurodivergent individual. The research was conducted by searching for papers relating to neurodivergence, focusing on attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) specifically, in the computing world, Python as a first programming language, and how it may uniquely benefit or challenge those who are ADHD, autistic, or ADHD/autistic. Much of the context on the benefits of learning coding for the neurodivergent mind came from non-peer reviewed articles. It was determined that supplementing the knowledge gained from peer-reviewed papers with these articles enabled us to bring together information that is seldom found in the fields of psychology, medicine, or computing. In combining the information gathered on neurodivergence, ADHD, autism, computational thinking, the benefits of learning Python and coding in general, it was discovered that learning to code, Python specifically, can benefit those with a neurodivergent mind and how coding is especially suited for them.

Research Question(s)

- Why study Python first over other programming languages?
- How is learning coding, Python specifically, is beneficial to neurodivergent individuals?
- How are neurodivergent individuals are especially suited to be coders?

Understanding Neurodivergence

Research was focused on neurodivergent individuals that have been diagnosed with attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). Both are labeled as neurodevelopmental disorders by the American Psychiatry Association in the DSM-5.

Language – Alternative neuro-affirming language (ANL) is identity-first, where it would be “an autistic person”. This language is preferred in the neurodivergent community. Traditional medial language (TML) would be “a person with autism”. Neurodivergence is not a disease/injury/illness that you can catch but is how your brain is wired to process the world around you

ADHD - ADHD is defined in the DSM-5 as “impairing levels of inattention, disorganization, and/or hyperactivity-impulsivity“.

ASD - ASD is “characterized by persistent deficits in social communication and social interaction across multiple contexts, including deficits in social reciprocity, nonverbal communicative behaviors used for social interaction, and skills in developing, maintaining, and understanding relationships”.

Comorbidity - Research has shown that there is a strong overlap in people who are both ADHD and ASD, called a co-morbidity. It has been suggested that there is an average of 59% co-morbidity with ADHD and ASD.

Misdiagnosis Monday
ADHD vs Autism
ADHD
OVERLAP
Autism
Seeks Novelty
Motivated by new and exciting experiences*
Attention Regulation
Persistent trouble focusing, except when highly interested
Difficulty with Social Cues
Challenges with focus and attention can cause missing social cues or impulsivity can lead to disregarding them
Interest-Based System
Motivation and focus driven by personal interests
Hyperactivity & Impulsivity
Restlessness & difficulty regulating impulses*
ADHD combined and hyperactive type*
Stimming & fidgeting
Sensory differences
Impulse control difficulties
Emotional regulation difficulties
Higher rates of substance abuse, suicidality, depression, anxiety, eating disorders, bipolar & OCD
ND communication patterns (info-dumping, connecting over shared interests, story swapping)
Executive functioning difficulties
Increased risk of victimization
Divergent thought patterns
Special interests & passions
Task-switching difficulties
Neurodivergent masking
Eye contact differences
Social differences
Passionate focus
Seeks Familiarity
Finds comfort in repetitive behaviors and routines
Preference for Routines
Adheres to routines for comfort and predictability
Difficulty with Allistic Social Cues
Brain doesn't subconsciously process social cues, requiring prefrontal cortex analysis and decoding
Monotropism
Tendency to focus intensely on a single interest or activity
Need for Verbal Context
Benefits from clear, detailed verbal explanations and context
DR. MIKE MISDIAGNOSIS MONDAY SERIES
A person, can experience both!
Neurodivergent insights

Why Python as a First Programming Language

With a wide range of programming languages available today, a common question is which one is best suited for teaching programming fundamentals. The current trend shows an increasing number of universities are opting for Python as the language of choice for introductory programming courses, with KSU recently starting to offer it in fall of 2023.

Benefits:

- Support of object-oriented programming, procedural, and functional programming
- Can run across multiple platforms
- Wide availability of third-party libraries
- Easy-to-read code, clean syntax, and greater intuitiveness compared to other programming language
- Ability to structure the program in many ways

Benefits of Learning to Code with a Neurodivergent Mind

Learning Python can benefit the overall lives of neurodivergent individuals by empowering them to develop valuable skills:

- Logical problem-solving
- Creative thinking
- Organization

These skills have been shown by several studies to often be especially challenging for neurodivergent learners as compared to a neurotypical individual.

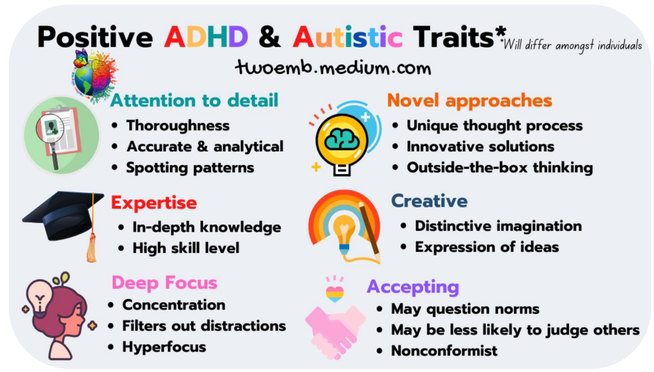
- Immediate feedback allow learners to see the results of their learning immediately.
- Python is also highly flexible and allows users to tailor their coding projects to their own personal interests.

How Coding is Suited for the Neurodivergent Mind

- Python’s logical problem-solving process plays to pattern recognition and attention to detail, which are strengths of those who are autistic.
- The debugging process keeps ADHD learners engaged with immediate feedback.
- Neurodivergent learners can be beneficial in developing new code as their minds tend to see new and unique ways to approach a problem.
- Autistic learners bring additional skills with their attention to detail.
- Both autistic and ADHD learners have “a tendency toward perfectionism that can elevate overall quality”.

Conclusions

Overall, through a review of the literature available, it became clear that Python’s unique attributes, including its simplicity, readability, and structured environment, make it an effective tool for neurodivergent learners. For those who are ADHD, Python’s immediate feedback and intuitive syntax help sustain engagement. For autistic learners, its predictability and alignment with strengths like pattern recognition support learning. Future research should aim to expand the body of knowledge by conducting empirical studies which directly investigate the experiences of neurodivergent learners. Understanding how programming languages like Python can support neurodivergent learners could influence real-world teaching strategies, and even workplace accommodations.



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Contact Information

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References

Future Research Plans

The full abstract of this literary research has been accepted as a work–in-progress to the 2025 Frontiers in Education conference. Plans to move forward with additional research to further studies on neurodivergence in coding, to highlight the benefits of learning to code as well as what neurodivergent individuals can bring to the coding world are in progress.

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